CLAIMS

What is claimed is:

1. A method for manufacturing an exhaust emission control device comprising:

disposing a mat support and a substrate in a shell, wherein the mat support is disposed between the substrate and the shell, and wherein the shell has a roughened surface in physical contact with the mat support.

- 2. The method recited in Claim 1, further comprising forming the roughened surface by coating at least a portion of an inner surface of the shell with a material having a plurality of rough edges.
- 3. The method recited in Claim 2, wherein the material selected from a group consisting of ferrous materials, and mixtures comprising at least one ferrous material.
- 4. The method recited in Claim 2, further comprising plasma spraying.
- 5. The method recited in Claim 1, further comprising forming the roughened surface by a method selected from a group consisting of air blasting, classic machining, extrusion technique, rolling a sheet of shell material between rollers, wherein one or both rollers has grooves or punches, striking a die surface that has protrusions to form opposing shapes in the shell material, forming an oxide coating, spraying with molten metal, acid etching, electro-plating, impacting the shell with objects, securing a second material comprising voids and/or protrusions to the shell, and combinations comprising at least one of the foregoing methods.
- 6. The method recited in Claim 1, further comprising forming the substrate with a roughened outer substrate surface.

- 7. The method recited in Claim 6, further comprising roughening an outer substrate surface by a method selected from a group consisting of air blasting, machining, coating, extrusion technique, and a combination comprising at least one of the foregoing methods.
- 8. The method recited in Claim 7, wherein the roughening further comprises using a wire brush or a cutting tool.
- 9. The method recited in Claim 7, wherein the roughening of the outer surface further comprises embedding a material in the outer substrate surface.
- 10. The method recited in Claim 9, wherein the material comprises a plurality of rough edges, and wherein the material is selected from the group consisting of mullite, silica, pulverized scrap substrate material, calcined/boehmite, alumina, and mixtures comprising at least one of the foregoing materials.
- 11. The method recited in Claim 7, further comprising embedding a material in or on at least a portion of an inner surface of the shell.
- 12. The method recited in Claim 11, wherein the material comprises a plurality of rough edges, and wherein the material is selected from the group consisting of ferrous materials and mixtures comprising at least one ferrous material.
- 13. The method recited in Claim 7, further comprising machining substantially all of the inner surface.
- 14. The method recited in Claim 1, further comprising wrapping the mat support around at least a portion of the substrate to form a wrapped substrate, wrapping at least a portion of the wrapped substrate with porous metal to form a metal wrap, and stuffing the metal wrap in the shell.
- 15. The method recited in Claim 14, further comprising adhering the porous metal to the shell.

- 16. The method recited in Claim 1, wherein the roughened surface is a portion of an inner surface of the shell disposed adjacent to the mat support.
- 17. The method recited in Claim 1, further comprising embedding a material in or on at least a portion of an inner surface of the shell.
- 18. The method recited in Claim 17, wherein the material comprises a plurality of rough edges, and wherein the material is selected from the group consisting of ferrous materials and mixtures comprising at least one ferrous material.
- 19. The method recited in Claim 1, further comprising machining at least a portion of an inner surface of the substrate to form the roughened surface.
- 20. The method recited in Claim 1, wherein the roughened surface has a R_t of about 25 μm to about 3,000 μm .
- The method recited in Claim 20, wherein the R_t is about 50 μm to about 1,500 μm .
- The method recited in Claim 21, wherein the R_t is about 100 μm to about 1,000 μm .
- 23. The method recited in Claim 1, further comprising roughening at least a portion of an inner surface of the shell, wherein the roughening is accomplished with a method selected from the group consisting of rolling with at least one roller comprising grooves or punches, striking the inner surface with a die surface that has protrusions or cavities, heat treated the inner surface to form an oxide coating, spraying with molten metal, acid etching, electro-plating with a rough surface; impacting the inner surface with objects at sufficient velocity to locally deform the inner surface, securing a second material with voids or protrusions to the inner surface, and combinations comprising at least one of the foregoing methods.

- 24. An exhaust emissions control device, comprising: a shell;
- a substrate disposed within the shell; and
- a mat support disposed between the substrate and the shell, wherein the shell has a roughened inner surface in physical contact with the mat support.
- 25. The exhaust emissions control device recited in Claim 24, wherein an outer surface of the substrate comprises a coating that increases the coefficient of friction between the outer surface and the mat support.
- 26. The exhaust emissions control device recited in Claim 24, wherein the inner surface comprises a coating that increases the coefficient of friction between the inner surface and the mat support.
- 27. The exhaust emissions control device recited in Claim 24, further comprising a sheet of expanded metal disposed between the shell and the mat support and attached to the shell.
- 28. The exhaust emissions control device recited in Claim 24, wherein the roughened surface has a R_t of about 25 μm to about 3,000 μm .
- 29. The exhaust emissions control device recited in Claim 28, wherein the R_t is about 50 μm to about 1,500 μm .
- 30. The exhaust emissions control device recited in Claim 29, wherein the R_t is about 100 μ m to about 1,000 μ m.
- 31. The exhaust emissions control device recited in Claim 24, wherein the roughened surface is a portion of an inner surface of the shell disposed adjacent to the mat support.

- 32. An exhaust emissions control device, comprising:
- a shell;
- a substrate disposed within the shell; and
- a mat support disposed between the substrate and the shell, wherein the mat support comprises a porous metal.
- 33. The exhaust emissions control device recited in Claim 32, wherein the shell further comprises a roughened inner surface.
- 34. The exhaust emissions control device recited in Claim 33, wherein the roughened inner surface comprises a portion of the mat support adhered to the shell.